ART. XIII.—*Report of the Board of Directors of Internal Improvements of the State of Massachusetts, on the Practicability and Expediency of a Rail Road from Boston to the Hudson River, and from Boston to Providence, submitted to the General Court, January* 16, 1829. *To which are annexed the Reports of the Engineers, containing the Results of their Surveys, and Estimates of the Cost of constructing a Rail Road on each of the Routes selected. With Plans and Profiles of the Routes.*

HAVING devoted a portion of our last number to an examination of the Reports upon the Baltimore and Ohio rail road, we should not at present have called the attention of our readers to the documents named at the head of this article, had not the subject become one of peculiar interest, at this moment, from the position in which it has been placed by the legislature of Massachusetts. Engineers have been engaged during the two last seasons, under the superintendence of different commissions appointed by the government of the state, in making very thorough surveys of the country between Boston and Albany, and also between Boston and Providence; the routes which offer the greatest advantages for rail roads in those two directions have been selected; a species of rail road, to be formed principally of materials found in abundance along the several routes, and which will combine the advantages of solidity and durability with those of cheapness and simplicity of construction, has been particularly described, and the cost of construction carefully estimated. Inquiries have also been made, to determine the amount of business to be accommodated, and other facts necessary for forming an estimate of the degree of benefit to be expected from these works. The results of these investigations are submitted in the Reports which form the subject of this notice, to the legislature, with a strong recommendation that the construction of rail roads upon both routes should be undertaken at the cost of the state.

The legislature, instead of acting definitively upon the question thus submitted to them, at their late session passed resolutions declaring their opinion that it is expedient to aid and encourage these works by the funds of the state, and recommending the subject to the people for their consideration, and to the next legislature, as deserving a thorough examination, and

an early decision. The difficulty of forming a satisfactory judgment on a subject involving so many details, in so short a period as was allowed after the publication of these Reports, and the magnitude and novelty of the undertaking, afforded strong reasons for deferring a final decision upon the question presented to the legislature, and for appealing to the sense of the public at large upon it.

In this state of things, the people of Massachusetts are loudly called upon to examine into the merits of this question, that they may make such a decision upon it as will be creditable to their intelligence, as well as consistent with their own best interests. Feeling the obligation of citizens thus called upon to form an opinion on this subject, we have carefully looked over these Reports, and made such an examination of the facts and principles stated therein, as will enable us to present our views of the improvements here recommended.

The distance from Boston to Albany, by the most favorable of the routes surveyed, is found to be one hundred and ninety-eight miles; that by the roads now most travelled being about one hundred and sixty-five. This route is on a line so nearly level as to admit of being travelled throughout by locomotive power alone, without the aid of any description of stationary power, in surmounting the elevations to be passed. By the adoption of stationary powers, on inclined planes, in surmounting some of the steeper declivities, it is supposed the distance might be reduced to something less than a hundred and ninety miles, without any considerable increase of the elevation to be passed.

The distance by the most level of the Providence routes, from tide waters on Front Street in Boston, to the neighborhood of deep navigable waters, at Fox Point, in the southerly part of Providence, is forty-three miles and forty-eight chains. This is about two miles farther than by the shortest road now travelled. It is found that no part of the inclination on this route need exceed thirty feet in a mile, and that no aid of stationary powers will be required.

The route which is recommended for the Albany road, passes through the towns of Newton, Framingham, Westborough, Worcester, Brookfield, and Palmer, to Springfield; and thence, through Westfield, Chester, Pittsfield, Canaan, Chatham, and Castleton, to Greenbush, on the Hudson river, opposite to the city of Albany. On this line the estimates of cost are made, but it is supposed that occasional de-

viations from it may be advantageously made on the final laying out of the road. In proceeding westwardly from Boston on this route, the line of the road, when formed on the principles assumed in the estimate, will have an ascending inclination for ninety miles and a half, a descending inclination for ninety-four miles and a half, and it will be level for thirteen miles. On forty-nine miles of the ascending part of the road, and the same number of miles on the descending part, the inclination exceeds the rate of twenty-six feet to a mile; and on these portions of the road, varying in their rate of inclination from twenty-six to eighty feet per mile, it is computed that the resistance or acceleration of the motion of the load by its gravity, will be greater than the resistance from friction. On the other hundred miles of the road, the inclination will be so slight, that the gravity of the load will act advantageously in aiding its motion in descending, in the same degree that it will act disadvantageously in ascending. The travelling on these parts of the road, therefore, will be nearly as easy, and accomplished by about the same exertion of travelling power, as it would be if it were level. On the forty-nine miles of ascending road, an additional travelling power will be necessary, proportioned to the degree of inclination. On the forty-nine miles of descending road, no exertion will be required to move the load forward, but precautions will be necessary to retard and regulate the motion.

It is computed, that on all parts of the road constructed in the manner described, except those which make up the forty-nine miles of steep inclination, an average load for a single horse, travelling twenty miles per day, will be sixteen thousand pounds, or eight tons of two thousand pounds each, exclusive of the weight of the wagons; and that, on the steepest parts, an additional horse will be necessary for conveying the same load, travelling ten miles a day in an ascending direction, and returning the same distance. It is further computed that the cost of transportation for heavy articles, exclusive of tolls, will not exceed a cent a mile per ton. The particulars of this estimate are stated in the report. Admitting the assumed cost of labor to be correct, of which every one conversant with such subjects can judge, and admitting also the correctness of the statements which are found in works of acknowledged authority, of the ordinary performance of horses on rail roads which have been for some years in use, the form and inclination of

which are particularly described, there can be no doubt of the accuracy of this estimate. It being once ascertained what degree of locomotive power is necessary for the conveyance of loads of a given weight on a level rail road, or on a road of a given inclination, it is easy to calculate the power which will be necessary on a road of similar construction, having any specified rates of inclination. In this estimate, there appears to be an ample allowance for the increased power which will be required in consequence of the departure from a level line.

In the above estimate of the cost of transportation, it is assumed that the road will be made without the application of stationary powers to surmount any of the declivities in the route. The Report, however, recommends, that before the road is finally laid out, further examinations and calculations shall be made, with a view of determining whether it may not be expedient to adopt a system of stationary powers, on inclined planes, for the purpose of passing the principal elevations in the line of the road. Such an investigation ought unquestionably to be made, and a careful estimate of the comparative cost and value of the two modes of construction. After the proper surveys and inquiries shall have been completed, it will be easy to make such a comparison as will leave little doubt which of the methods of passing these declivities should be preferred. Should it prove on inquiry, that there is a sufficient supply of water to afford a permanent moving power on most of the elevations, there can be little doubt that it will be found expedient to appropriate this power, which can be obtained at an extremely low cost, to this purpose.

The principal facts necessary for this inquiry, which have not yet been ascertained, are, the saving which may be made in the distance, by admitting of steep inclinations instead of those never exceeding eighty feet in a mile; the cost of constructing inclined planes, with the necessary machinery; the cost of the stationary power, whether it be water or animal power; the cost of attendance, and of the probable repairs of machinery; and the comparative length of time required to pass, in the two modes.

On most of the rail roads of any considerable magnitude in England, stationary steam-engines are used for the purpose of moving the loads over the steep elevations. They are also adopted on the rail road connected with the Hudson and Delaware canal, leading to the Lackawaxen coal mines in

Pennsylvania. But this species of power would not be at all adapted to the convenience of the irregular travelling, on a public road like that here proposed. Besides this objection to the use of steam power for this purpose, it is evident that it would have no advantage over horse power, in a part of the country where the cost of fuel for the supply of the engines would exceed that of keeping a sufficient number of horses or oxen, to perform the same amount of labor.

On the Stockton and Darlington railway, which is the longest in existence now completed, the loads are moved principally by locomotive and stationary steam-engines, but partly by horses. The cost of maintaining locomotive engines in England, near the coal mines, and where, consequently, the expense for fuel is low, is greater than that of keeping the number of horses, in this country, which will exert the same degree of power, provided the horses travel at a slow pace. But if the pace of the horse is accelerated, his power is diminished in a much greater ratio than his speed is increased. With steam power, acting on a locomotive engine, it is otherwise. The same power which will move twenty tons a given distance per hour, will move ten tons double that distance in an hour; so that the effect produced is the same in a rapid as in a slow rate of motion. For rapid travelling, therefore, locomotive engines may be cheaper than animal power. But they are applicable only to the conveyance of loads of many tons' weight, and are therefore not suited to the purpose of moving stage-coaches. Indeed the resistance to the motion of a carriage on a rail road is so slight, that the cost of horse power, even at the low degree of exertion which he is capable of when travelling at a very rapid rate, is a matter of small consideration, compared with the cost of travelling in any of the ordinary modes. The power of a single horse is sufficient for drawing a stage-coach as fully loaded, and at as rapid a speed, as the passengers will desire. For other purposes than the conveyance of passengers, a rapid rate of travelling is not, in general, of any great advantage. It is not probable, therefore, that locomotive engines will, for the present, be found advantageous in this country.

But if by the use of horse power on a rail road, the cost of transportation can be reduced as low as a cent a mile for the conveyance of a ton; if a single horse, travelling at a slow and natural pace, can draw a load of eight tons, exclusive of the weight of the wagons, and a stage-coach loaded with

fifteen or twenty passengers, when travelling at a speed of nine or ten miles an hour; it is evident that such a rail road, passing through a rich and populous country, must be of immense benefit, and that it will not only afford a great facility to business, but will produce a great increase of business and of profits.

The Report goes into a variety of investigations, for the purpose of showing the amount of business which will be thus accommodated. The data for this calculation are derived from a great number of scattered sources; and many of them are too uncertain to be very fully relied on. The results are stated with a good deal of reserve, and the aggregate of the estimate appears to be moderate. In this estimate, the business that is expected to pass the whole road, between Boston and Albany, is not relied on for more than a fifth part of the whole income. This amount is supposed to be about a third more than the present amount of business between the two places. A material increase of this business is anticipated, not so much from a reduction in the cost of transportation, as from the greater expedition and certainty of the conveyance, and from the continuance of an advantageous trade through a great part of the winter, when the present outlet of the trade of Albany is closed. These are certainly substantial grounds for anticipating a great increase of business, and the introduction of a much more extensive direct trade than is now carried on, in place of that which at present centres in the city of New York. The extent of this increase must of course be in a great measure a matter of conjecture. It could not be considered an extravagant supposition to place the amount much higher than the estimate in the Report.

Some persons have expressed a belief, that if the rail road were built, the trade between Boston and Albany would still be carried on by water, because this conveyance would be cheaper than that by the rail road. Those who have adopted this opinion, must have taken it up without due examination. It will be found on inquiry, that the customary freight for heavy articles, which pay at the lowest rates, between Boston and Albany, is three dollars and seventy-five cents a ton, but that, for the purpose of filling up a vessel, which would otherwise sail with part of a cargo, certain articles, particularly flour and mackerel, which are the most considerable articles of transport between the two cities, are often taken at two

dollars and fifty cents a ton. We have the authority of the largest importer of flour from Albany for the two last seasons for saying, that he has never paid less than twenty-five cents a barrel for the freight of flour, that he often pays thirty-seven and a half cents, and that he thinks the average price paid by him about thirty-one cents. Those who ship but transiently, and in smaller quantities, of course generally pay more. The gentleman above quoted, and others competent to judge, are of opinion that the business could not be carried on at so low a uniform rate of freight as the lowest price above named. To the freight must be added, for the cost of water conveyance, the insurance, at an average of three fourths of one per cent. on the value of the article. This would be, on a ton of flour, from thirty to sixty cents; on most other articles more than this amount, and on the cheapest of manufactured goods, which will form a large part of the transport, more than the above rates of freight.

In these facts we place entire confidence, and therefore cannot doubt that a rail road, constructed in the manner proposed, will command the whole transport between Albany and Boston, provided the tolls are placed as low as is recommended in the Report, namely, a dollar a ton for the whole passage. Higher tolls might be charged on the more costly articles. The distinction proposed to be made in the rate of tolls, on articles carried through the whole line, and on those which are carried to or from the interior of the country, will be entirely reasonable, and will probably be necessary for obtaining a proper income for the support of the road. It will be reasonable that the compensation for the use of the road, should be in proportion to the benefit afforded by it. It is on this principle that bulky articles, of small value in proportion to their weight, are usually charged at low rates of toll, on rail roads and canals, in comparison with more costly articles. Where the transportation on the rail road comes in competition with water conveyance, as between Albany and Boston, the tolls must be low, or there will be no inducement to prefer the rail road. Where the only competition is with the conveyance by land, on common roads, much higher rates of toll may be demanded for the use of the rail road, and still the benefit will be far beyond the price paid.

However great may be esteemed the benefits anticipated from the facility which this improvement will afford, to the com-

munication between Boston and Albany, and to a direct trade between the manufacturing towns of the East and the agricultural regions of the West, the accommodation of the intermediate country must be regarded as the leading motive for undertaking this great work. The cost of transporting merchandise and produce any considerable distance by land, in the ordinary method, is so great, compared with that of water conveyance, that this disadvantage alone is sufficient to make trade, and every branch of industry, languid and unprofitable, compared with the same degree of industry and skill, exerted in parts of the country where nature has furnished a cheaper mode of intercourse. Every one, in estimating the bounties which nature has conferred on different states and countries, has been accustomed to regard the possession of extensive navigable rivers as among the most enviable advantages, on account of the facility which they afford to intercourse and trade. The late improvements of steam navigation have given these natural channels of intercourse a new value, so that they have become the great highways not only for trade but for personal intercourse. The introduction of steam-boats, with luxurious accommodations, travelling with a rapidity heretofore unheard of, on the Long Island Sound and the Hudson and Connecticut rivers, has given to the parts of country bordering on those waters, more decided advantages over other parts of the country, than they before possessed, and drawn to those routes much of the business which was formerly carried on by land transportation, in other directions. But a very large tract of country, including the whole of the central and western parts of Massachusetts, and a large portion of several of the neighboring states, is remote from either of these channels. To these parts of the country it is important to afford some substitute for the advantages of navigation, which their situation does not permit them to possess.

The rail road will furnish them that substitute. It will afford a method of communication in some respects superior to any inland navigation. It will not be so cheap as sloop navigation, but it will be more safe and more free from interruption. It will probably not admit of the conveyance of passengers quite so rapidly as steam navigation under the most favorable circumstances, but it will admit of their being carried more safely, and at a cheaper rate, unless in cases where by the latter great numbers are carried. The cost of locomotive power in the

fast travelling steam-boats is very great. The power of the engines used in these boats is nearly equal to a horse power for each of the average number of passengers. On the rail road the power required will be but that of a single horse, when travelling at a very rapid rate, for a large coach-load of passengers. The cost of conveying merchandise will not be greater, independently of tolls, than that of the same conveyance on a canal, and the tolls may be less, in the same proportion as the cost of the work is less.

It has sometimes been erroneously inferred from the fact stated by elementary writers, that a boat may be moved on a canal at the slow rate of two miles an hour, by one third of the power required to move the same weight on a rail road, that the cost of transportation by the former mode, will be two thirds less than by the latter. This is a great mistake. A horse does not in fact draw three times the amount on a canal, which he usually draws on a rail road. Two horses are usually employed in drawing a boat with a load of about thirty tons; and what is more material, two men are required, besides the person who drives the horses, to conduct the boat. The slow pace at which they necessarily move, limits the progress of the men, as well as of the horses, to about twenty miles a day, unless they travel through the night, in which case two sets of men are necessary. The daily cost of two horses at fifty cents, two men at one dollar each, and a boy at fifty cents, is three dollars and fifty cents for the conveyance of thirty tons twenty miles, or six hundred tons one mile. On the rail road, two horses at fifty cents each, travelling twenty miles in six or seven hours, and two other horses to be driven the same distance on the same day, by the same driver, with one man at one dollar, will cost three dollars for conveying sixteen tons forty miles; which is equal to six hundred and forty tons, one mile. The allowance for the expense of horses must be increased on the steep parts of the road, but the expense for the conductor is the same. In the above estimate a horse is supposed to draw fifteen tons on a canal, or what is equal to three hundred tons drawn one mile daily. Heavier loads are no doubt often drawn by a single horse, but we believe that this is fully equal to the average load. Taking together, therefore, the cost of locomotive power, and the necessary attendance of men, that which is required for transportation on a rail road is lower than what is required on a canal.

Transportation by a good rail road, therefore, must be as cheap as by the best canals. It has a great advantage over canal transportation in its greater rapidity even in the conveyance of merchandise, and this advantage is of much greater moment in the conveyance of persons. It gives to rail roads a value for the conveyance of passengers only, nearly equal to that which they have from the conveyance of property. They have the still further advantage of being less liable than canals to interruption. Canals are necessarily closed by frost four or five months in a year, and they are liable to interruption by droughts, and by the failure of their banks. Rail roads are not interrupted by frost, nor by a light snow. In some seasons they will be interrupted by deep snows, but the interruption will be much shorter than that to which canals and rivers are always liable. They may be interrupted by other accidents, but the injuries to which they are liable are not likely to be so extensive, or to require so long a time in the repair, as those to which canals are subject.

By opening a channel of communication of this description, adapted to all purposes of business through a tract of country two hundred miles in extent, filled with an industrious population, who rely in part on foreign products for their subsistence, and on the exportation of the products of their industry for their means of wealth, there can be no doubt that a new vigor would be given to the public industry, and a new value to the resources of the state. The population of the five western counties is about two hundred thousand souls. Nearly the whole of this population would pass over some part of the rail road, on their way to the best markets for the sale of their products, and for the purchase of their supplies from abroad. An equal number of people, inhabiting the borders of Connecticut river in New Hampshire and Vermont, and the parts of Connecticut adjoining this state, would derive a similar benefit from this rail road. To these should be added the inhabitants of that part of the state of New York through which the route passes, and of part of the county of Middlesex, and it will be found that the number of inhabitants who would be more or less accommodated by this rail road, is equal to more than half the population of the whole tract of country which depends for the transport of its produce and supplies on the New York canals, including the whole of the northern and western parts of New York, and the western parts of Vermont.

The Directors, in their Report, estimate the cost of the rail road at a sum which may be procured on the credit of the state at an interest of one hundred and fifty thousand dollars per annum, and the annual cost of superintendence and repairs at fifty thousand dollars more. In their estimate of the income which may be expected from the use of the road, in the present state of the population and wealth of the country, they endeavor only to show that the business will be amply sufficient to produce this sum at very low rates of toll. They argue that if, in the present state of the country, the income of the road will be sufficient to defray the whole of the annual charges, including the interest on the cost, the additional income, arising from the increase of population and business which may be reasonably anticipated, may be relied upon as a fund for paying off the debt at no remote period; after which, the whole income of the road will remain as a perpetual revenue to the state, to be appropriated to further improvements, or in such other manner as the legislature may direct. The whole burden and risk to which the state will subject its treasury, by undertaking the work, will be, the payment of the interest on such part of the debt as shall be incurred before the road begins to afford an income, and the hazard that the income may fall short of the amount estimated. Against this hazard, is to be set off the chance that the income may exceed the estimate, and the whole unincumbered income of the road, after the debt shall have been paid off.

But this is not all. Another view is presented in the Report, of the advantages which will result from this improvement, in the increase of business, and the increased value of property in the state. The precise amount and value of these benefits cannot be estimated; but we agree fully in the opinion intimated in the Report, that, independently of the other advantages, from the increased facility of transacting business, the immediate increase of the value of real estate in the Commonwealth would be more than equal to the whole cost of the road. If these anticipations are well founded, there are twice the inducements which are necessary for this undertaking. The cost will be twice repaid, once in refunding that cost in the direct income of the road, and once in other pecuniary benefits which the citizens of the Commonwealth will derive from it.

We have remarked that the Directors in their report attempt to show only that the annual income of the western road

in the present state of population will be equal to the annual charges, including the interest on the cost. This estimate appears to be extremely moderate. Nearly half of this amount they anticipate will be derived from the conveyance of passengers, and one fifth from the business between Boston and Albany, of which we have already spoken. The residue must be derived from the business of the intermediate places, and of all those parts of the country which will be in any degree accommodated by it. The population to whom this road will afford the best access to a large market, in the whole or in part, cannot be numbered at less than five hundred thousand. Of the income which may be derived from the business of such a population, some conjecture may be formed, by comparing this business with that done on the New York canals.

The Erie and Champlain canals measure about four hundred and thirty miles in length, and their cost was ten millions of dollars. The amount of tolls received on them, the last season, was eight hundred and thirty-five thousand dollars, and the preceding year eight hundred and fifty-nine thousand dollars. It appears from the last report of the canal commissioners that the navigation of the canals was open from the 1st of April to the 19th of December, a period of eight months and fifteen days, and that this was the longest period of navigation, which has occurred in any season. In this period of a little more than two thirds of a year, these canals have afforded an income which would be sufficient in four years to pay the whole cost of a rail road from Boston to Albany.

We know that some persons have adopted the belief, that the people of New England have nothing to transport on a rail road or canal, and that on this account the work here proposed will bear no comparison in its advantages, with the great canals of the state of New York. They appear to forget that the people of the interior of Massachusetts, New Hampshire, Vermont, and Connecticut, live as well, and in their mode of living consume as much (and we might perhaps safely say much more) of foreign merchandise, and products of the seaboard, as the inhabitants of New York, who receive their supplies through the canals. To enable them to pay for the articles thus imported, they must carry something abroad, of the produce of their home industry. These exports, it is true, do not consist of two or three great staples, like the wheat and flour of New York, and they are perhaps in general not so

bulky, in proportion to their value as the present products of the northern and western parts of the state of New York, which are in a larger proportion the fruits of agriculture. Many products of the interior, however, which are of great weight and bulk in proportion to their value, will be transported on the rail road, such as wood, timber, charcoal, and lime. Besides these articles, there are now transported a great variety of coarse manufactures of wood and other materials, pork, butter, cheese, and live stock. There are now annually brought to Brighton for the supply of the market of Boston and of the neighboring towns, thirty-seven thousand fat cattle, one hundred and thirty thousand sheep, and twenty-two thousand swine, weighing twenty thousand tons; a large proportion of which are brought from the west. These might undoubtedly be brought most economically, either dead or alive, upon the rail road.

With the present means of transportation, the produce of the interior, carried abroad for sale, must be sufficient in amount and value to pay for the supplies brought from abroad for the consumption of the inhabitants. It is well known, that the people of the interior of Massachusetts and other New England states are accustomed to use for their subsistence, not only all the foreign productions which are in common use by the inhabitants of the western parts of the state of New York, but several other articles from abroad which the inhabitants of that part of the country produce for themselves. Among these articles are flour, salt, and plaster. Singular as it would have seemed a few years ago, a very large proportion of the farmers of these states depend in part for the subsistence of their families, on flour from New York or the more distant states. Salt is obtained by them from abroad exclusively, but the people of the western part of New York procure their whole supply of this article, as well as of flour, at home. The importation of these articles adds very materially to the amount of transportation, and a greater quantity of articles must be exported to pay for these imports. From these facts, and from what is well known of the habits of living among the inhabitants of the interior of New England, it may be confidently inferred that they require a greater amount of transportation, for the supply of their families, than the same number of inhabitants in the parts of the country through which the New York canals pass.

We have already spoken of the comparative amount of

population accommodated by the two improvements. It is a low estimate to compute the number of those who will transport their supplies and produce upon the Western rail road, at half those who depend on the New York canals. The average distance of transportation on the rail road, will perhaps not exceed half the average on the canals. If, therefore, we suppose that half the quantity of merchandise transported on the canals, will be transported on the rail road, and that the average distance of the transportation will be half, the amount of tolls, if charged at the same rates, will be one quarter, or two hundred and ten thousand dollars per annum. This, it should be remembered, does not include the estimate for passengers, as the amount of tolls for passengers on the canals is inconsiderable.

To this mode of calculation it may be objected, that in the estimate of the population accommodated by means of the canals, we do not include the inhabitants of Ohio and the Canadas, who live beyond the terminations of the canals, and receive a part of their supplies through them. To this we reply, that the proportion of merchandise which will be carried through the whole course of the rail road, for the supply of inhabitants not included in the number supposed to be directly benefited by the road, is much greater than that which is carried through the whole course of the Erie canal to Buffalo, and through Lake Champlain to Canada. The whole amount of property received at, and transported from Buffalo on the canal, in 1827, was short of twenty thousand tons; and in 1828, the amount was still less. The amount conveyed to and from Canada, through the Champlain canal, is not known, but it is undoubtedly less, with the addition of the amount belonging to persons residing west of Buffalo, than the amount which will be transported to and from Albany, over the whole course of the rail road.

If, therefore, we are correct in our premises, that the population of the interior of the New England states requires as great an amount of transportation (including the supplies of flour, salt, plaster, and raw materials for manufactures, and the new exports of wood, marble, lime, and other heavy articles which the rail road will enable them to make,) as the same number of inhabitants of the western and northern parts of New York, our conclusion cannot be denied, that, at the same rates of toll, this transportation will afford an annual income of more than two

hundred thousand dollars, independently of that which will be derived from the conveyance of passengers. The estimate in the report of the Directors, is but little more than half this amount. Their estimate, it will be observed, is made at the low rates of a half cent and a cent a ton per mile, whereas the canal tolls are nearly all at the rate of three cents a mile for the transportation upward, and the greater part at the rate of a cent and a half for the transportation downward. The transportation on the rail road, with the exception of that through the whole route from Boston to Albany, will bear to be subjected to as high rates of toll as that on the canals, though sound policy may recommend the adoption of lower rates.

If it is still objected that we estimate too highly the amount of produce which will be exported on the rail road, we will suppose, for a moment, that nothing is exported, and that the supplies required by the inhabitants to be imported, in proportion to their numbers, are only equal to the imports on the New York canals. The tolls received at Albany and Troy the present season, which we understand to be exclusively for the transportation upward, amounted to more than two hundred and fifty thousand dollars. Tolls at the same rate, on half the amount of merchandise, carried half the average distance, would amount to more than sixty thousand dollars. This alone is within about ten thousand dollars of the amount estimated in the Report of the Directors, as receivable on the whole trade of the interior, including exports and imports. This will serve further to confirm our opinion, that the estimate in the Report is extremely moderate, and the rates of toll assumed by the Directors much lower than may be charged, if it shall be found desirable to enhance the amount of revenue above that estimate.

The Directors, in their Report, estimate the present number of persons travelling on the several routes between Boston and Albany, and on parts of the route selected for the rail road, to be equal to seventy-five passengers, both directions included, per day; and that, if by means of the rail road the time of performing the journey should be reduced to twenty-two hours, and the cost to three dollars, this number of travellers would be doubled. This number of passengers, at a toll of a cent each per mile, would afford an annual income of ninety-three thousand and nine hundred dollars. Nothing can be more unsafe than to undertake to determine with confidence what number

of persons will travel on a given route, in a very different state of things from any which has yet existed. The number here assumed is apparently a moderate estimate. At any rate there can be no hazard in considering it as certain for the present purpose; for if the number should fall short of this estimate, the toll on the actual number might be doubled, without the least hazard of driving them to any other mode of conveyance.

There are some other parts of the Report of the Directors, on which we intended to have made some remarks; but this article is already drawn out to too great a length. The Reports of the engineers show that their investigations have been thoroughly, carefully, and scientifically made, and the results are very clearly and satisfactorily stated. These Reports contain a vast deal of topographical information, which will be useful for other purposes than those for which the surveys were specially made. The inquiries and calculations for the estimates appear to have been very elaborate, and we believe they are made on principles which entitle them to the strongest confidence. The care with which all the reports are elucidated by maps and plates is deserving of commendation. These are so complete as to render every part of the Reports perfectly intelligible.
